

Also includes notes FOR SEPT 16-18,
1943

LIST OF PHOTOGRAPHS TAKEN BY
FOSHAG, #'s 1-75

LIST OF FISHER'S FILM ??

MEXICO - PARICUTI
RECORD
1945

U. S. GOVERNMENT PRINTING OFFICE
PROPERTY NO. 50177

$$12 \times 16 = 192$$

1 sec	=	16 feet
2 "	=	64 "
3 "	=	144 "
4 "	=	256 "
5 "	=	400 "
6 "	=	576 "
7 "	=	784 "
8 "	=	1124 "
9 "	=	1296 "
10 "	=	1600 "
11 "	=	1536 "
12 "	=	2304 "
13 "	=	2704 "
14 "	=	3336 "
15 "	=	3440 "

Speed of Sound
1142 ft per sec.

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2430 camp 3020
2470 ridge
2685 n. slope
2635 ~~2660~~ terrace east
2640 ~~2660~~ inner ridge east
2725 Pico east
2710 West Peak
2620 - Bottom of valley

El. 300 meters

50177

Manufactured by
U. S. Government Printing Office

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Sept. 16, 1943

Left Uruapan at 10 a.m. Low hanging clouds, screening the volcano, which we did not see until we reached the old campment. The cone was distinctly lopsided, much higher to the south. The smoke column was normal. Explosions were erratic and the weakest I have seen. Considerable dense smoke with infrequent good bursts of bombs, bombs not large, and in general falling on the upper part of the cone.

Night show rose to regular. During most of the night the cone hidden by fog and rain.

Sept. 17 Strong wind to west carrying smoke column against west flank of crater. Frequent strong bursts from center of crater with numerous small to medium bombs, shooting up fingers about 500 meters and varying from 3 to 20 seconds apart. Many were compound bursts, that is one, followed immediately by a second, or even third impulse. In late afternoon saw a

long remolinos, revolving rapidly, and normal to the slope of the cone, beginning at the crater rim and travelling slowly down the slope. The remolinos extended from the slope to the smoke cloud.



Length of the remolinos about 600m. diameter about 10 meters.

Travelled down the slope in about 1min.

Later saw a thick one slowly form on the thick dust about the summit of the cone, and again a thin and very perfect one, like a "culebra" extend from the dust to the smoke pall, revolving rapidly and then melt away. The second one carried a thin ash column below it.

Beneath the arching smoke cloud, the air showed much turbulence. The dust from the falling bombs was drawn along the side of the

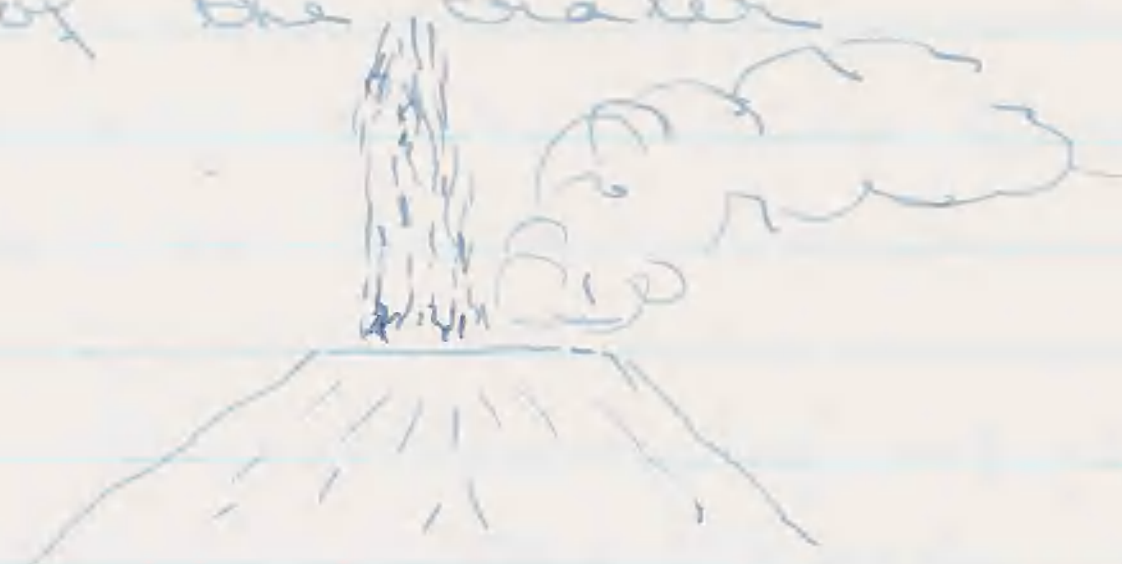
cone toward the summit, where it met the dust cloud drifting downward. Below the dust cloud the vapor clouds were sucked into the ash cloud in a huge inverted funnel.

Later the remolinos formed frequently, sometimes two at one time. Some were thick and rotated languidly, others thin and well defined, rotating rapidly. Some were estimated at a kilometer in length, from the slope of the cone to the point where they joined the smoke cloud. Some ~~now~~ changed their position very little, others moved down the slope of the cone, across the ash field to the base of Parícutin Hill.

They frequently began as a whirlwind in the ~~the~~ ash cloud near the summit of the cone and gradually advanced toward the smoke cloud.

Left Parícutin about 5 P.M. Night display from road very good, with high fingers of incandescent rocks ^{from crater} and the ash

cloud blown against the west
rim of the crater



Activity somewhat diminished in
the evening.

Sept 18.

Left Huapán about 10 A.M.
From the rock, woody smoke column
but not high and with little
smoke plume. Apparently activity
much decreased.

The Azul river is located on the
nose of a small ridge extending
from the west side of a small
basin in limestone. Entering this
basin from the northwest is the
deep Huayula arroyo, whose head
waters are in the high main
mass of the Huasteca, with steep
sides of rhyolite flows and
limestone conglomerates. The
smaller Chacalacas Arroyo enters
the basin from the north, also
cutting conglomerates and rhyolites.
The Huayula arroyo leaves the
Azul basin (Huayula Hoya) by
means of a small narrow
valley in limestone.

The east slopes of the Hoya de
Huayula are made up
entirely of medium bedded limestone
with a general strike of NW-SW
and dip of N.E. Except for the
relatively steep slopes along the
Arroyo de Huayula, the upland
surface is rolling and represents
a moderately old topography with
scattered small sink hole basins.

The northern and eastern slopes
are somewhat more irregular.

"Zapalote"

with more rounded topography low smooth ridges and short shallow arroyos but with scattered huge boulder masses of volcanic tuff or rhyolite. These smooth lower slopes consist of softer limestone conglomerates the overly unconformably the limestone-shale series. The higher rim of the basin are rugged wooded cliffs of rhyolite cut by deep canyons representing thick, all defined flows dipping gently to the N.E.

The southern limit of the basin is a limestone ridge cut by the Arroyo de Huajuquilla.

The basin appears to owe its origin to headwater erosion uncovering, in part, an old ~~at~~ sink hole basin at the pre-conglomerate surface, or perhaps an old head water basin of a pre conglomerate drainage system the was at one time connected with the present Amacuzac system. The bottom of the Hoyo de Huajuquilla is now made up

of scattered areas of basement limestone and of partly removed limestone conglomerate. In the Cerro de la Cruz, near Acuitlapan, the tuffs rest directly upon the old limestone surface. If there ever were limestone conglomerates on the old surface between the Azul mine and this hill, there is now no evidence remaining of their possible former presence.

Don't they also thin out to the N.E. beyond Xochitlan?

Doesn't it, with the Acuitlapan cap represent the S.W. edge of a basin extending to the N.W. under the Huasteca? Don't they probably originate in the high Sierra south of Julianilla?

Does the original basin lie between the Sierra de Julianilla and the Sierra de Xochitlan?

149

shale, immediately followed by

tuff

Small bench of 1st

tuff

rhyolite - fault

Cg. - fault

150

Cg. minor fault.

Charolacas.

Cg. faulted (?)

Ss.

Huayfilla arroyo.

al.

Huayfilla sign. al. & fault

arroyo al or fault

Cg.

arroyo

Cg.

Azul rd

minor fault.

white rock.

arroyo.

Cg.

152

1st shale.

Cg.

Fault

Scop

Cg

phy

small

Cg.

T

Jan. 16, 1945.

Photo 10 from new station
5:15 P.M. with small white
steam column. Dusty

E.C. During morning large gray
explosive column with frequent
bursts, gradually becoming
paler and weaker until
4 P.M. when explosive column
was very pale gray with almost
pure steam

E.C. At 5 P.M. weak cloud very pale
gray in color with deep vibrant
roars, without cauliflower and
lazy column, apparently only
steam activity in the throat

During the night numerous tremors.
Perhaps the new cabin is built so
tremors as to be more affected. Seems like
many tremors and sound of explosion
almost coincident. also one
subterranean "quake"

Jan. 17, 1945

E.C. 8:00 AM. Heavy gritty cloud, light gray in color rising languidly

E.C. 8:30 Heavy roars yielding a rather wide but tenuous column that does not rise very high but drifts slowly to the east. color pale grayish brown, occasional weak cauliflowerers of same color. Ash cloud to the east apparently from 9:00 AM. column.

E.C. at 12 PM. column changed to less erratic gray column with few cauliflowerers and not much noise.

Slide At about 11:30 a slide of ash occurred on the N.W. slope of the cone extending from 20 meters above the base to almost the rim, flattening the cone slightly on this slope. No indications of any lava break thru at this point.

While resting on top of August ridge noticed that the ground was tremulous, the strongest shakes coming at irregular intervals. Could not correlate these shakes with any activity in the crater. Traced several places and found them

much weaker on the east slope of the ridge.

E.C. During the night the eruptive column diminished, until hardly any column was apparent but activity increased, the noise being heavy rolling thunder that shook the cabin, meanwhile bomb bursts in fairly quick succession sending up blunt cones, with the highest bombs up to 8 seconds. Very few bombs fell on the north slope. Shaking of the ground was very much weaker this night than last.

Partly cloudy. dusty. cold at night

Jan. 18

E.C.

8.00. Full pale gray cloud rising lazily with occasional languid cauliflower: cloud with gutty appearance. Noise intermittent low rumbling growls to low rumblings. Column rising vertically and lazily for lack of wind.

1:30 Heavy light gray cauliflowers with sound of heavy surf.

In front of the campamento de abroa, a ridge has been raised in the old lava flow 35 m. high, with the ash beds dipping steeply quasiverisally, except for some horizontal remnants on top. At the tremor zone, tremors are still perceptible, altho in the arroyo immediately south, washed into the ash none were felt.

The San Juan flow S.W. and S. of the cone is newly crevassed. These crevasses, sometimes 2 meters wide and 5 or more meters deep are filling with ash and will form ash dikes



Many times, when there is no confusion from repeated shocks, a good shot is followed by the noise of the explosion at 4 seconds. (aged of sound). When there are no tremors there are no explosions.

Mesa de los Hornitos

Aguan Flow

The Aguan flow, at its source, is now frozen over and is a jumble of broken blocks, variously colored brown, yellow and orange. Some slumping and collapse has taken place here. There are patches of iron chlorides and a few low hornitos, none now very active. The large hornito at the head of the flow is covered with bombs from the crater.

Arcs.

2:00 P.M. heavy explosions apparently from the south crater with good cauliflower heads of light gray color, noise like heavy cannonading and flashing arcs. One large destined explosion will produce a single well defined arc. a heavy intermittent rumbling a series of successive arcs in rapid succession.

Dissection

In the new arroyo at the Campamento de abroa, the ash is dissected to a depth of about 8 meters and shows several layers of pebbles and cobbles from the Caniguato basalt.

Placed tubes in fumaroles A1 and A2. after 6 hrs collected a liter

of condensates from A2. but A1.

condensates was working very poorly. In A2 condensation in the lead tube and in the gas tube took place rapidly.

EC. at about 6 P.M. activity in the crater began to decrease and during the night many good bomb bursts with reduced eruptive column.

Shocks. Many earth shocks during the night.

Clear all day but dusty

Jan. 19.

8.00 A.M. Thin white vapor column but with heavy swarms.

11. A.M. Same but with somewhat increased column

12. A.M. Full cauliflowerers lasting all during afternoon.

Placed tube in hot fumarole A3 on pressure ridge on 2d. Paricutin flow. This is a narrow ridge about 5 meters high along the crest of which ~~are~~ is a line of hot vents issuing from beneath the surface rubble. The largest one is brilliantly colored orange and yellow.

EC. In the evening eruptive column decreased and became intermittent altho the noise increased.

Shocks. Strong microseisms during the night.

Jan. 20.

~~At~~ 8.00 A.M. little eruptive column of white steam but strong roars.

The eruptive column gradually increased until at 10 A.M. good column, pale gray, almost white.

F.C. 2 P.M. strong column activity with great following cauliflower and heavy noise with ejection of large viscous masses. Some flashing arcs.

Continued in this manner until evening.

Aquan

Went to the Aquan flow. The flowing lava issues from a low domed tunnel. At its throat it is about 3 meters wide and the lava flows at a rate of about 45 m. per hr. The surface is firm and is pulled like taffy. Tied a tube in a small almost extinct hornito but there was not enough vapors to condense in the tube.

Shocks

During the night few microseisms

Jan. 21

Morning: Large dark gray lazy eruptive column and much fine ash falling, particularly to the north. Low rumbles in the crater 12 A.M. increased column with cauliflower and little or no noise, remaining so all afternoon.

6 P.M. reduction in smoke column to thin vapory column with greatly increased noise. 9 P.M. intermittent thin column and heavy noise.

Shocks

Strong microseisms during the night.

minerals

Collected minerals during the day at the fumaroles on the August flow. Found that crevices in the ash with slight greenish stains on both sides indicated good salts below. The iron chlorides are confined to a narrow zone of a few inches. Below the iron salts are burned to an iron oxide, above is only damp ash.

Jan. 22.

Morning - weak gully column
of gray color and heavy surf
sound, much fine ash in the
air. Column rises very slowly
with very few weak cauliflowerers.

During mid day and early afternoon
heavier cloud with cauliflowerers.

Left camp at 4:30 P.M. on way to
Crater. Eruptive column medium
dense at Summit 5:55 P.M.

The throat was in active eruption,
throwing out numerous bombs
up to 9 sec. (1300 feet). The crater
showed but one throat, the south
vent, the second vent having
disappeared or perhaps joined
with the south vent, having previously
been separated only by a thin septum.

The bench now seems lower and
wider than on Nov. 26, the Nov. bench
perhaps corresponding to the upper
low ridge. The southern half of the
crater is funnel shaped, with
angle of repose, leading to what
seems a steep walled explosive
pipe. Bombs rolling down landing on
this slope rolled back into the
throat.

The west half of the crater consisted



Jan. 22, 1945.

2685

of a curved terrace and somewhat higher a low narrow ridge extending across the terrace half way. The lower part of the terrace was well littered with bombs, the upper half pocked with bomb craters.

The vent is estimated to be 10 meters below the lip of the trench and appeared to have a diameter of about 3 meters, altho it could not quite be seen because of its position at the foot of the terrace. Explosions took place in the vent with great violence, imparting a strong rocking motion to the crater rim, with about 10 explosions per minute. The interval and the strength of the explosions were erratic. Maximum size bombs reached about 1 meter across and were frequently irregularly flat shaped. These larger bombs seldom reached 150 feet high. The bomb bursts were frequently directed slightly to the west, where the slope was corrugated toward the throat with rolls a few feet high. Sometimes

crater

However the bursts were directed slightly to the south east where the crater wall was even.

The cauliflower heads began a few meters above the throat, first expanding rapidly but soon blowing up. Frequently the eruptive column drifted slowly around the crater walls with a spiral motion, even to the extent of filling the whole crater. When such a cloud passed over our position one could detect a distinct odor of H_2S but not of HCl , and a filthy semi-pumiceous ash fell as irregular fragments some to the size of a fist.

The bombs appear to be all semi molten and wobbled in their downward course.

After dark the effect was awesome and undecidable. The incandescent bombs lit the crater with great speed, forming a fan shaped plume of fire. The larger bombs could easily be discerned, but the smaller ones were streaks of light to the eye. These smaller ones were

crater

invisible during daylight

Both in daylight and after
 compression waves in
 the eruptive column frequently
 followed the bursts. With a
 rumbling roar their wings followed
 one another in quick succession.
 In spite of the tremendous
 explosions the noise at the
 crater rim could not compare
 with that of Nov. 26. One could
 easily be heard talking in a
 normal tone of voice.

Jan. 23.

EC. During the morning a small
 eruptive column rose from the
 west rim driven there by
 a strong east wind.

Left the camp about 10:30 AM.
 to climb the cone accompanied
 by Mr. Tremblay. Activity in the
 crater like last night, perhaps
 somewhat stronger.

Cone The upper part of the cone is
 dappled a canary yellow from
 efflorescence of iron chloride and
 the bombs embedded in the ash
 are sometimes encrusted with it.
 The surface of the cone is now
 fine ash, dry on the surface up
 to about $\frac{1}{2}$, then moist. The
 surface is not hot, but slightly
 steamy warm.

At about 12:30 the wind changed
 to the W and the crater became
 filled with cloud. Remained so
 during the rest of the afternoon.
 Toward evening the column
 diminished until only weak
 steam arose and during the
 night nothing discernible arose
 from the crater except bombs
 but the vapors condensed as

F.C.

E.C. a great white cloud high above
 condensing the crater. The explosive noises
 greatly increased during this
 phase. This phase undoubtedly
 represented steam jets from a
 cleared outflow. Bomb activity
 was normal, with fine normal
 bursts against the blue moonlit
 sky.

Jan. 24.

E.C. Fine column rising straight up
 on one fine column, with low
 rumbling noise, increasing in
 size during the afternoon to
 full column with good cauliflower.
 This was the best eruptive column
 during the present period,
 continuing well into the night.
 Returned to San Juan.

Jan. 25.

Moderate eruptive column.

E.C. During the period Jan. 16-25 the
 eruptive column was generally
 weak in the early morning, increasing
 during late morning, decreasing
 again about 4 or 5 P.M. During
 the weak column the noise was
 a grating roar, indicating steam
 jets. The midday activity was
 medium to strong cauliflower
 bursts varying from low to
 deep surging sound, followed in
 late afternoon and evening by
 steam jets again.

Aqueous Flow The aqueous flow was moving in
 two tongues, one toward
 the west, the other more active

one toward Panzingo and the mesa to the east.

The third Parícutin flow, beginning between the cone and an uplifted ridge that ran to the Campamento de Abasco flowed slowly, filling covering the last flow (Nov. 8) of the 2d. Parícutin flow, filling the hoya at the n.w. base of the cone and sending a long narrow tongue on the 2d. Parícutin flow toward Parícutin village.

Flows.

Feb. Mar. 1943

May 1943

June, July, Aug 1943.

Sep. Oct. 1943

Zapicho, Oct. Jan. 1943.

San Juan Jan. 8 - 1944 - Nov. 9, 1944

2d. Parícutin flow

Aguan flow.

3d. Parícutin flow.

Observations on the Fumaroles
Jan. 1945.

Fumarolic activity is greatly reduced. The San Juan, 2d. Parícutin and Aguan flows show very few fumarolic spots. The only areas of fumaroles are on the Zapicho flow east of the camp, the August ridge, southwest of camp, the front of the high flow from the August flow and the peaks of the first Parícutin lava. All are acid and do not yield such sublimates like the early flows. The hornitos of the San Juan flow are all practically extinct and yield few sublimates, these chiefly iron chlorides and some sulfur. Hornitos on the Aguan flow are weak and last only a short time, yielding strong acid fumes. Bluish fumes rise from the incandescent lavas of the Aguan and 3d. Parícutin flows. The lower San Juan flow is cold - without any fumaroles. The 2d. Parícutin flow shows scattered incipient fumaroles, which may develop later.

On some of the older, deeply ash

covered flows are cracks in the ash cover. Where the area about these cracks is slightly stained with iron chlorides, salts are usually encountered by digging to a depth of a foot or more, below which are cemented ash layers.

Rock alteration varies about the fumaroles. About the hottest ones a thin film of rock is altered to reddish color but the interior appears fresh. Where condensation takes place and the rock is wet, the rock may be extensively altered to a brick red color. Condensation appears to be essential for extensive alteration. Dry steam, even tho it contains HCl, does not appear to be very effective.

Fumarole Samples

A1.

A small fumarole 7 meters above base of Aug. 1943 ridge, alongside a large block of agglomeratic lava, somewhat altered and spotted with canary yellow crusts.

Opening 30 x 15 cm. emitting good steam. Throat crusted with aborescent white crystals.

Odor slightly sulfurous.

Litmus paper - acid.

Taste of condensate faintly saline; separates a little black sulfur.

$T = 116^{\circ} \text{C}.$

Rock alteration: to a red crumbly mass, with crystals of sulfur in the crevices.

Aqueous condensate large,
solid condensate moderate.

A2.

On a ridge of the first Paricutin flow, near summit, now largely covered with ash. One of a group, the throats lined with white salts and the wall rock impregnated with yellow and orange iron salts.

Opening 50x20 cm. with fungus like crust of white salts

Odor very faintly sulfurous.

Taste very sour

$T = 314^{\circ}\text{C}.$

Aqueous condensate abundant
Solid condensate "

Rock alteration: slight oxidized skin
Sublimates in throat white, around throat speckled orange, rock sparse
canary yellow.

A3.

Top of middle ridge on 2d Paricutin flow, issuing from underneath banks, apparently issuing from a crevice underneath. Heat waves and little visible vapors. The rocks in the hotter portions are crusted with flesh colored oxidized dust; in the cooler portions with canary yellow and light orange reaction salts. No deposited primary sublimates

Odor strongly acid, choking.

Aqueous condensate moderate

Solid condensate sparse.

Taste strongly acid.

$T = 500^{\circ}\text{C}.$ or more.

Rock alteration: red oxidized skin, apparently unaltered rock beneath.

A 4.

Front of thick flow from Aug 43 ridge, near the Summit. Part of a group in and about ash covered rock faces. This one was completely covered with ash. Made an opening and found a crack in the ash 1-2 inches wide from which gases issued rather strongly.

Ash layers contained much iron chlorides.

Odor faintly sulfurous.

Taste sour astringent.

Aqueous condensates abundant
solid condensate sparse.

T = $460^{\circ}\text{C.} \pm$.

The covering ash is oxidized and impregnated with salts.

Sun. Feb. 25, 1945.

Arrived the night before with excursion of the Mexican Geological Society. Activity then from the crater was stronger than I had seen it for a number of months, with occasional bomb bursts on the north slope.

Meandering lava could be seen on the Parícutin flow but activity from the Hornos area has decreased considerably. One small red spot was seen in the Aguas flow indicating some slight activity.

During the day heavy smoke column and strong activity from the crater, apparently from two throats. Rain of fine ash at the cabin and some mud. At the base of the cone frequent heavy mud falls, the mud of which reacted acid to litmus and showed a content of Cl .

Mud.

Lightning

Occasional lightning in the eruptive column. Eruptive column billowing, medium gray, with fine cauliflower-like rising to great height.

May 27, 1945. Sunday.

With Carl Fries & Jack Dorr.

E.C. All during the day, pure white steam clouds from the crater mouth loud surging noise, throwing out bombs over the eastern rim of the crater but containing practically no ash. These steam jets were continuous except for very rare and brief pauses. There were 3 single and heavy bursts of dense ash rising swiftly from another vent, during which brief period the steam vent ceased its activity. The ash bursts were quite impressive, a huge, thick column rising to a height of a kilometer in less than a minute, almost filling the crater from rim to rim. E.C. Some bombs and much ash fell on the upper slopes of the cone.

Climbed the cone with Carl, Jack and Celadonio, remaining about three hours and circling the rim of the crater from the N.E. almost to the south. The crater contains two vents

rather of which occupies a position of the vents seen on previous ascents. One vent is close to the slope of the high eastern point, with steep slope from the point directly to the vent. This vent or throat could not be seen from any station that we occupied but was apparently 2 meters in diameter. This vent gave off almost continuously a rushing jet of white steam with a harsh grating roar that penetrated over body. Sparse bombs of brown color and spongy texture (Zapicho type) were thrown out, rising to an average height of 500 (6 sec) to 800 (7 sec.) feet, altho occasionally to 1600 (10 sec) feet. The column was slightly inclined toward the east, so that practically no bombs fell to the N.W.-W or S.W. There were rare pauses, the column almost immediately beginning again. The remarkable feature of this vent was the long continued emission of almost white steam, with little discoloration

by ash and little variation in the rushing exit of the steam.

The second vent was much deeper and larger, separated from the first by a narrow septum. It showed no emissions except the three huge cauliflower-like jets that it sent up during the day. The crater was regular, sloping down to a well defined conical point.

In the upper part of the septum that separated the two vents, on the side of the larger crater, were 3 incandescent orifices, the largest about $1\frac{1}{2}$ meters across from which issued strong jets of vapor. These were connected with the steam vent for their activity increased and decreased in consonance with the variation in the main steam vent.

The inner ~~to~~ north slope of the steam vent side of the crater sloped fairly gently to a narrow bench and then fell abruptly to the throat. The bench was slightly elevated.

and from it steam issued sporadically, to be sucked into the throat by the up-rushing column of vapor.

Between the ash vent and the west rim was a bomb-filled depression leading to a low inner rim about 6 meters high. From this inner rim, the crater sloped uniformly to its center. A low bomb-covered ridge runs from the west rim to the septum separating the two vents.

A slight sulfurous odor pervades the crater.

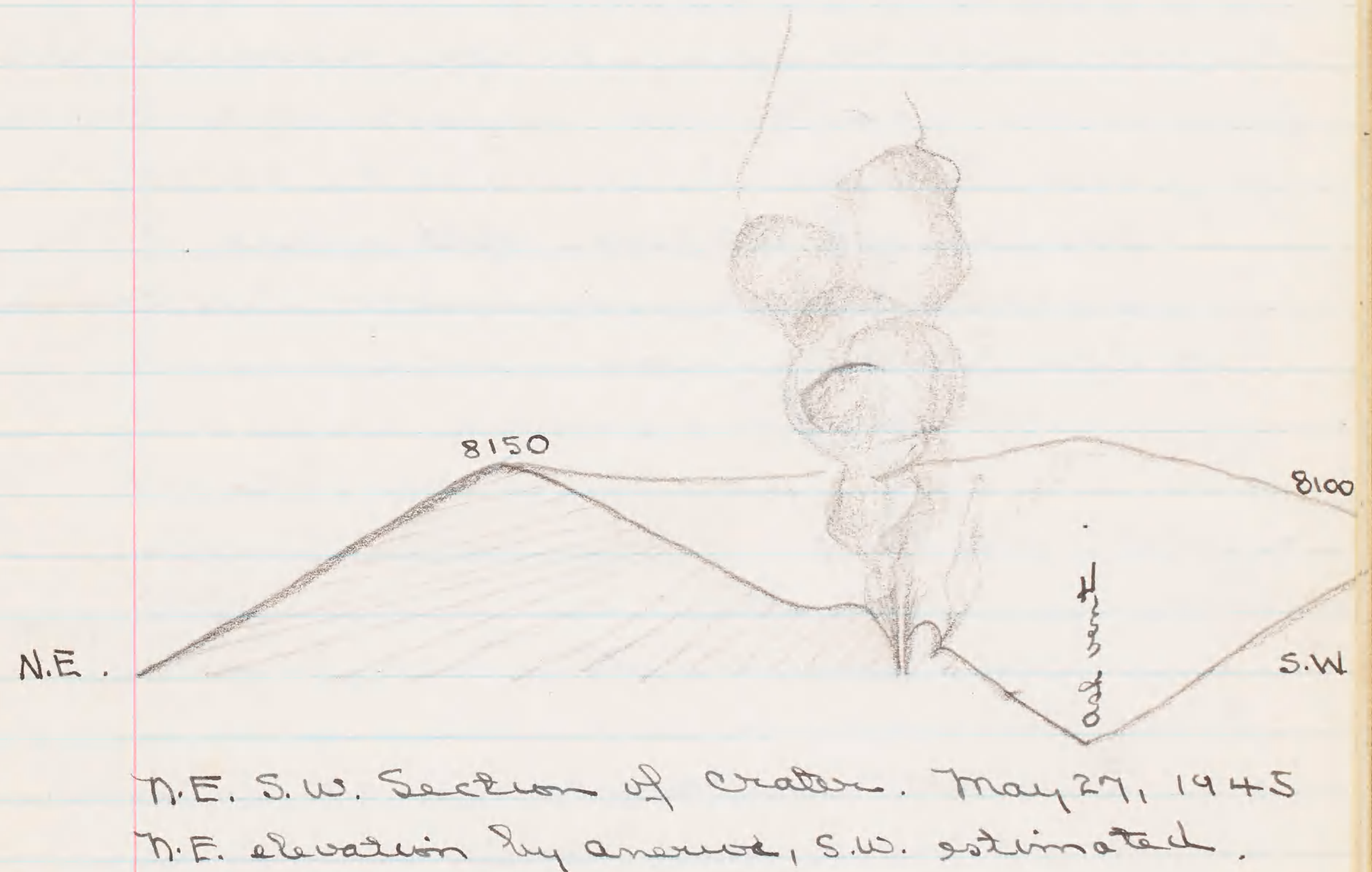
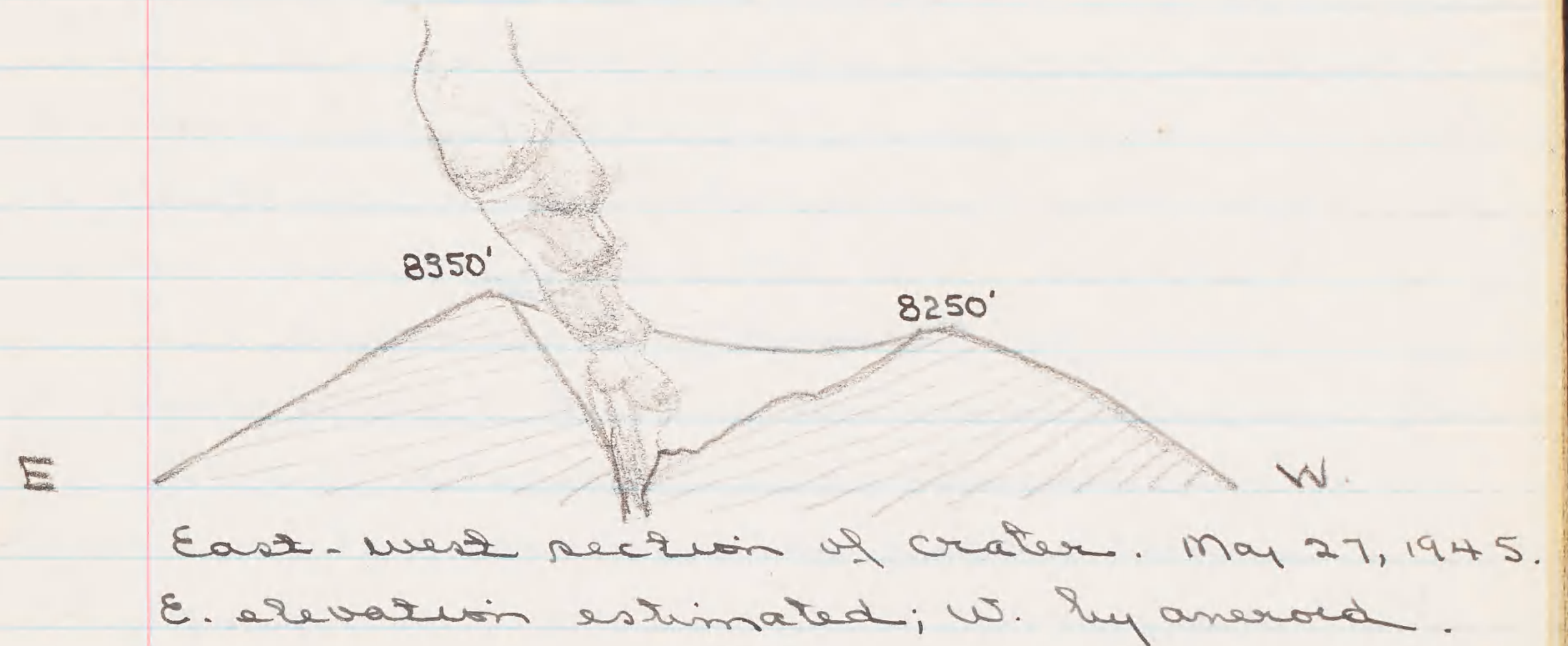
Calculate the amount of water vapor from:

- (1) An orifice of 2 diameters
- (2) Speed, from bombs that take 6-7 seconds to fall.
- (3) Temperature, from fact that vapor is condensed

The vapor column drifted to the west in the morning, to the S. in the afternoon.

Sky clear except for vapor column. Moon full.

Lava flows slowly from the Aguas vent.



May. 28, 1945. Monday

Went with Carl, Jack, Chuchi to the Aguan vent, following the north and north west base of the cone. On the way stopped at the fumaroles on the old Paricutin, June 1943 flow and found them unchanged in appearance. Also excavated a crack in the ash cover to search for minerals. The crack showed a zone of red crystals a few inches below the surface. Below this zone for about 1 foot were scattered small cauliflower-like heads of a white mineral, sometimes tinted pale blue. The steam issuing from the crack was very hot.

oxidized ash.

Red xls.
white cauliflowery

The old Hornitos area is uplifted and broken by large crevasses, scarps and rugged pinnacles. Two collapsed vulcanitos are still discernible, one about 6 meters high

and 9 meters wide, shows a wide collapsed center filled with sugar lava. Vitreous irregular bombs occur about it. Could detect no tremors in this area.

The Aguan vent has changed its position from the base of the cone to a vulcanito, 10 meters high about 100 meters from the base of the cone and 100 meters south west. The N.E. slope of this vulcanito is steeply conical, made up of blobs of lava. The S.W. side is broken down and shows a number of glowing hornito-like areas from which steam escapes with a loud hissing noise. A throat, about 3 meters across, occupies the west crest of the vulcanito, from which bluish fumes issue lazily. From the cone, to the S.E. for about 300 meters is a low scarp with incandescent crevices emitting copious bluish fumes and gases issuing with a hissing noise. To the west from the vulcanito is a similar scarp. about the base of this

scarp is cord wood lava, followed by an area of pahoehoe lava. This section shows no fumarolic activity.

About 100 m. east of the volcanicito the lava stream issues from a crevassed and sublimated stained low ridge of lava, at its origin about a meter wide but widening rapidly. At its origin it is moving about one meter in 15 seconds. Its surface is a scattering of vesicular, rugose lumps separated by very viscous incandescent lava. A rock thrown on the surface makes no impression and rolls, as on a solid mass. Blue, choking fumes are given off by the lava. Occasionally it bulges somewhat but does not heave or yield bursting bubbles.

The fissures in the older lava, giving bluish fumes deposit a colonial buff sublimates. Sparse white sublimates are also found in the cavities of older lava.

Between the volcanicito and the hills to the south, the lava is

deeply crevassed, due to lava movements below. This lava has apparently completely solidified and shows heat in only a few isolated spots, although not older than Nov. 1944. Individual flows 2-3 meters thick can be seen in these crevasses, separated by about 1 foot of red scoriaceous lava or baked brick red ash. The flows are vesicular throughout and sometimes show some crude shelling in the middle. No tremors were noted in front of the volcanicito.

Activity from the crater as of yesterday, with white steam column rising to medium altitude. During the day six huge bursts from the ash vent, three following each other in rapid succession during which the steam vent abated.

Funes and Dore climbed the crater in the evening to witness the vents at night. The small steam vents in the septum gave off small incandescent bombs when the main steam vent was

particularly active.

EC. While they were on the run the ash vent gave one of its bursts. It began with a noise like a small charge of explosive in loose ground and was followed by a rapidly rising but silent heavy column which mushroomed out overhead, raining down non-incandescent bombs and ash. The steam vent was normal up to the time of the ash explosion and there was no change in activity to indicate the coming of the ash explosion, which occurred instantaneously lighting at night in the ash column but not in the steam column.

EC. The activity of the two vents gives one a good clue to the variation in the eruptive column.

Ejecta The emission from the throat is almost entirely vapors. From the incandescent throat slag may be torn off but the violent rush of steam to yield bombs and ash a light brown

color and very spongy texture. The semi-viscous lining yields semi-bread crust bombs. With continuous heavy steam emission the throat remains clear and a white steam column, with vesicular bombs results. If the steam column covers the wall, as seen on a previous occasion, some ash is carried up from the crater walls, yielding a gray column, varying in density according to the amount of scouring. When there is a slide of crater wall material, a dark column is produced. Such was noted on

If the vent is choked with ash and rubble and when there is constant ploughing of the crater sides the column is rich in ash and bombs and is dark in color. (Temporary columns after the August break is extreme example).

Ejecta The ash may therefore be classed into two categories:
(1) primary ash and bombs -

the result of explosions directly from molten lava, or stripping of viscous lava from a throat. yielding in the first case light brown colored bombs with black vesicular interior ~~in~~ (Zapichu); in the second case Zapichu type effluvia and semi-bread crust bombs.

(2) Secondary ash and bombs, the result of re-worked primary material yielding:

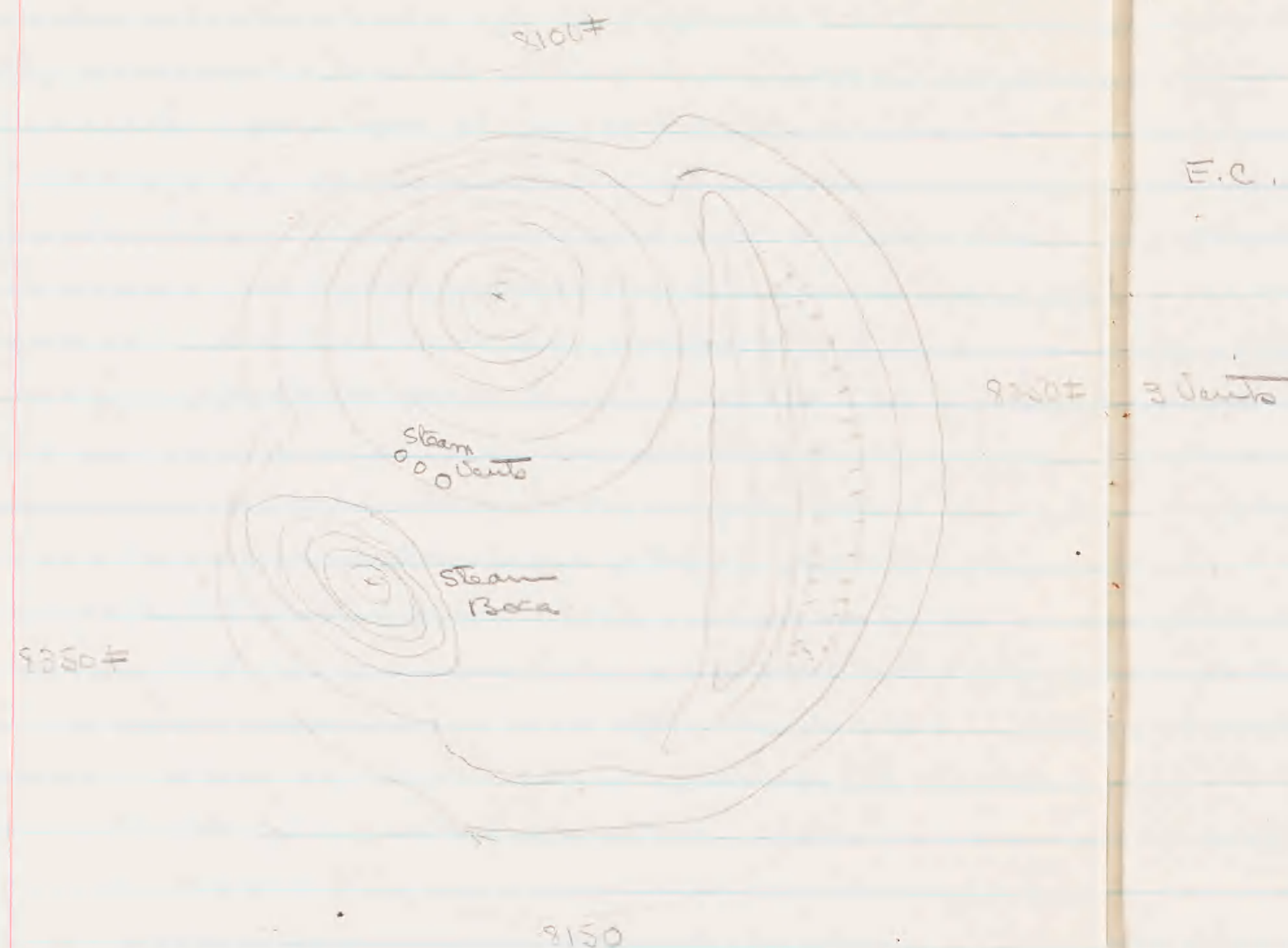
- (1) comminuted ash fragments.
- (2) coke like fragments
- (3) angular fragments from semi-bread crust bombs
- (4) "Boles" or rounded fragments produced by trituration
- (5) spalls, from breaking up of semi-bread crust bombs
- (6) Agglomerate masses from crater walls.

May 29, 1945. Tuesday.

E.C. During the early morning the cone was hidden by fog but the grating roar of the boiler indicated continued activity. About 8 am. the fog cleared and the activity appeared as yesterday with white vapor column but somewhat more erratic, with more frequent and longer intervals of quiet and not so much force in the column. During the morning 2 heavy explosions from the ash vent.

Cloudy.

Left San Juan 2 pm.



July 3, 1945.

Arrived at San Juan, mid afternoon with Weather, Ordóñez, Fries and Abraham.

E.C.

The crater was giving off a heavy column of ash, heavier than I have seen for some time.

Arrived at camp late afternoon.

The crater seemed to have three vents, of which the old north vent was in almost continuous activity, the south vent in sporadic heavy activity and fewer bursts from a new west vent. The north vent carried more ash than in May and was more sporadic. No lightning.

Fair weather during the afternoon. Fog in the evening and rain at night.

July 4, 1945.

Went to the Hornitos area in the morning, passing along the east base of the cone. The north vent was throwing bombs toward the east, rarely reaching beyond the cone. As we passed the Hornito area, a bomb burst from the west crater rolled bombs down upon us and we had a busy time for a few minutes. The south vent was in very active eruption, casting many bombs to the south, with billowing dark ash. While we were at the lava flow, the west crater gave a huge burst that littered the west base of the cone with bombs.

Bomb types:

Fragment

Irregular spongy.

Triturate cobbles.

Semi-bread crust.

A few small inclusions were noted in some of the bombs.

About 2 P.M. the activity from the vents subsided somewhat and by 2:30 P.M. the vents gave off only tenuous gritty dust. By 4 P.M. activity again increased

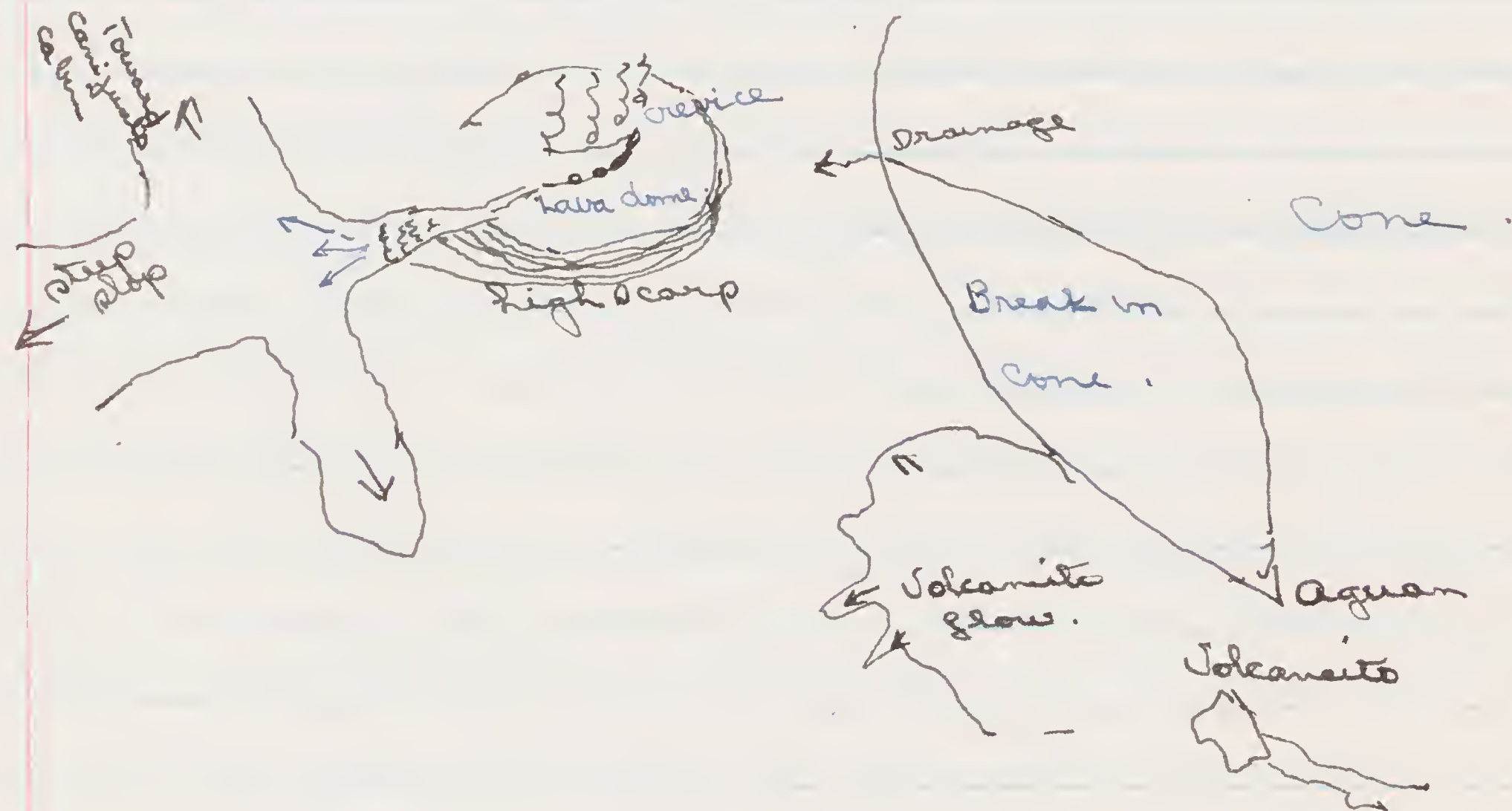
and it began to rain. By 6 P.M. the vents were again in high activity, the west vent more than previously, sending sporadic heavy bomb showers at a low angle to the west, sometimes beyond the base of the cone. The north vent rarely showered bombs to the east. The south vent gave off bursts to the south, sometimes with billowing incandescent ash.

At this time a few sharp pistol-shot like thunder. Continued like this into the night.

The lava flow came from a dome-like mass of lava about 100 meters from the base of the cone. It issued from a crevasse in the dome. The upper part of the crevasse cut the dome and showed a number of incandescent vents from which bluish fumes arose. The surface of the dome consisted of lumpy-like smoothish lava. To the south and west this dome terminated in a scarp as if it

had been elevated.

The lava issued as a small flow, about a meter wide but widened rapidly and broke into three tongues. It flowed at a rate of about 1 meter in 15 seconds and gave off gases with a hissing noise.



Again I was impressed by the quantity of lava that comes from what appears to be a very small vent, suggesting that the lava is perhaps rising from a fissure.

One could approach within six feet of the apparent vent and study the movement of the

lava at close hand. The lava did not appear to well up from any point, simply began to flow from a point, almost immediately beginning to fissure. Rocks thrown on the surface of the incandescent flow made no apparent impression and were carried along on the surface of the moving lava. A cobble thrown into a small fissure in the lava was gradually worked or kneaded into the mass.

The Aguan volcanite now shows no flow activity, altho the course of the flow shows gas vents and sublimates. The volcanite is more broken down than before but the conical hornito appears to be intact. Lava flows some several hundred meters to the east. To the south the lava is much recessed, some 5 meters deep. In these crevasses two flows can be distinguished separated by red oxidized ash or by red sariaceous surface. The lava is only moderately vesicular. It is only slightly warm.

A flow, apparently from the volcanite is slowly advancing toward the N. along the west base of the cone. Clutery type

Between the flow front and the base of Tanitaro, much ash has been washed in by the rains and the lava shows much white steam. In other place, too, the topography is modified by much ash brought down by the rains. Teladonic reports a barranca about 15 meters deep at the foot of Caniguato down which lava from the Hornitos boca flows.

The volcano is upon a plateau like mass of lava. The north front is steep and crevassed, about 7 meters high, appearing to have been raised up by a sill below. Between this plateau and the cone is the later flow.

Much blue lightning to the north.

No rain, clouding up until 3pm when slight sprinkling. Heavy wind in morning, a little fog in late afternoon.

July 5, 1945.

E.C.

In the early morning, activity like yesterday, diminishing about 10. am. a few sharp pistol shot cracks of thunder. In the afternoon, heavy column but with little force, so that the heads roll over the rim and down the slope, across the lava to Caniguato and then rising, forming a low drifting chain of heads.

Rain in the afternoon.

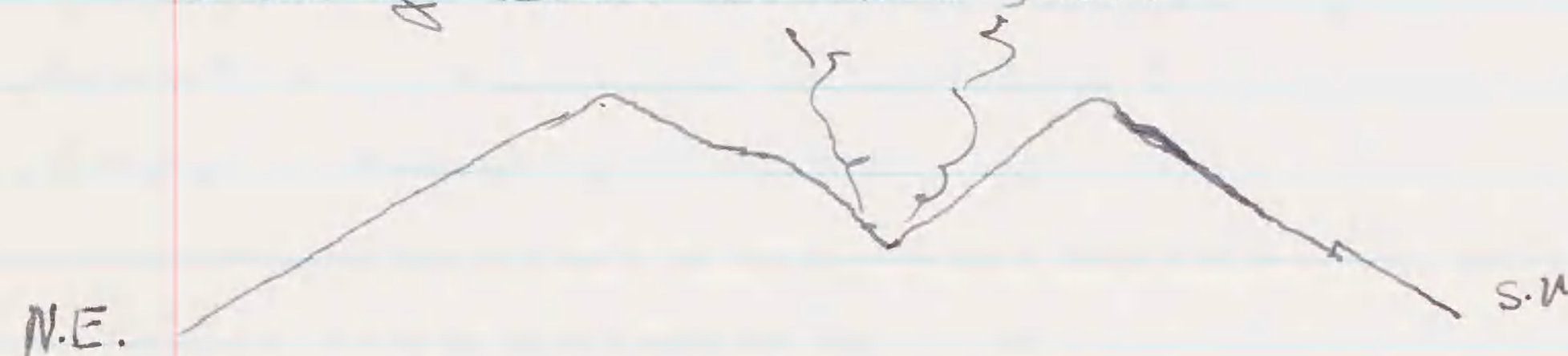
Left San Juan about 6: pm.

July 24

8 AM Weak emission of steam from the crater, drifting to the W. Occasional rumble, audible in San Juan.

9 AM. Increased activity with some cauliflower bursts.

Left in the helicopter - Beer pilot, flying over San Juan flow, then around to east and south side of cone. Crater with one throat, apparently the south vent, putting out much ash. Much steam along the east rim



Hornitos
lava

Lava flowing strongly from Hornitos box, flowing directly north in three channels, filling the valley between the August ridge and the old lava, cascading down just west of the August fumaroles and has filled the valley between Tratorio and the old Paricutin flow.

Aguan

No evidence of flowing lava from the Aguan flow, its vent marked by a patch of yellow

sublimates.

Few fumaroles any place, appears that most of them are in the black lava.

Description of lava surface.

10:30 Reduced activity, with very small
E.C. steam emission, increasing at times to more copious lazy emission

12 PM. Lazy cauliflowerers, drifting down
E.C. the side of the cone, the ash drifting along the north base of Canigato strong east wind. 10' Kodochrome.

From 12.00 to 4 PM. intermittent weak steam bursts and feeble cauliflowerers.

E.C. 4 PM to 6:30 White steam bursts with heavy rolling roar (steam vent explosion) with low drifting column of condensing vapor or detached cloudlets drifting to the west. Heavy east wind.

Rain at 6:20.

Lava Large lava flow from Hornito filling in valley between August ridge and Iratiro and the old lava. Fine cascade near its throat and at the lava front of the August ridge, the

latter about 25 meters wide and flowing at a rate of about 1 meter in 10 seconds.

The flow has a broad band of dark rubble in the center with incandescent edges. No odor. Tinkle of moving rocks. One large mass came sliding down the slope, a mass about 3m in diameter, solid.

10 PM. Thin column or lazy puff of pure steam.

July 25, 1945.

E.C. In the morning a thick column with many bomb bursts from the crater.

Continued so all day long showering bombs chiefly to the S.W. but occasionally to the N.E. apparently from 2 throats, the most active one the S. vent.

Went around the cone to the S. side by way of Zapicho to try to get better the lava vent.

at the S. side encountered a lava front, moving very slowly, that appears to have come from the Aguam vent, 8-10 m. high, black lava. The older, ash covered lava in front shows some collapse and fissuring immediately in front of the new flow.

Could not pass to the lava vent because of bombs.

Steady Much steam from vents on the old lava flows, due to rains and high humidity. In some places issues with hissing noise from the ash cover. Very few fumaroles.

Fumaroles The chief fumarole sector is now the N. face of the August ridge where Balts are still being deposited. Since some of the ash is washed off by the rains, three incandescent spots are visible at night indicating that the lava is still incandescent within a few feet below.

E.C. During the evening the cone was much obscured by fog, but there was a strong incandescence above the crater that waned and waxed with bursts in the crater. Also a strong incandescence above the lava vent so that more than $\frac{1}{2}$ the outline of the cone was encircled with a halo of pink incandescence. Faint lightning in the clouds high above the crater, but probably connected with normal storm activity rather than the volcano. Frequent and strong lightning for to the

noil and N.E.

Some tremors during the night
Rain in morning. Rest of
day and night cloudy and
foggy.

During the night the activity
of the crater was largely obscured
by fog but there was little
noise, except at times a deep
sighing or like a distant mill.
Very few bombs.

Heard a huacamayo, near the
volcano

July 26.

8:14³⁰ AM Thick but lazy column from
crater rising straight up,
into low overhanging clouds.
Few bomb bursts.

11:45. Thin tremulous gray column, lasting
for only a few minutes

12:00 Heavy eruptions with dense
column and many bombs.

3:20 PM. Heavy rain with some hail
and thunder

6 PM. All afternoon thick, dense
column rising straight up
in majestic column but with
little noise other than the
plop of numerous bombs and
their aggregated purish thru
the air. Many bombs and
ash cloud drifting far to
the west.

7:00 PM. Went to lava cascade, flowing
a continuous steady stream.
The flow is bordered by a
dike of rubble, 3 meters above
the flowing lava and 3-8 meters
across the base. The flow
spreads out funnel-like below
the cascade. The noise is a
tinkle of the clinkers that ride
the moving surface of the lava.

Saw a Humming bird over the lava, and a flock of 6 huakamayos flying high above the volcano.

Heat waves above the lava but no visible condensation of steam and no odor. A few yellow stains are begin to form on the dike.



Cross section of flow near base of cascade.

A huge mass of lava came riding down the cascade, a solid dome like mass, 7 meters long, 3 meters high, ~~like~~ like a ship upon a river.

During the night, heavy billowing column, rising majestically into the overhanging clouds. Numerous bombs up to 9 sec. (1300 feet). lightning One lone lightning flash, diagonally into the column 300 m. above the crater.

Reflections from the lava at the vent and at the cascade very much reduced.

Heavy ash cloud far to the west.

4 PM. Heavy rain with heavy thunder, some hail.

July 28, 1945.

EC. In the morning heavy bursts from the crater, apparently from two or more vents. Large black fumes, with numerous bombs. About mid afternoon much reduced activity with thin languid cloud.

About noon rain, continuing most of the afternoon, with thunder.

Mid afternoon, medium color, dense rising rather languidly into overhanging cloud.

Rain water Collected a sample of the rain at the casita. Filtered into clean bottle but it remained rather turbid. Reacted acid to litmus and had a faint taste. Sample collected after about 2 hrs steady rain.

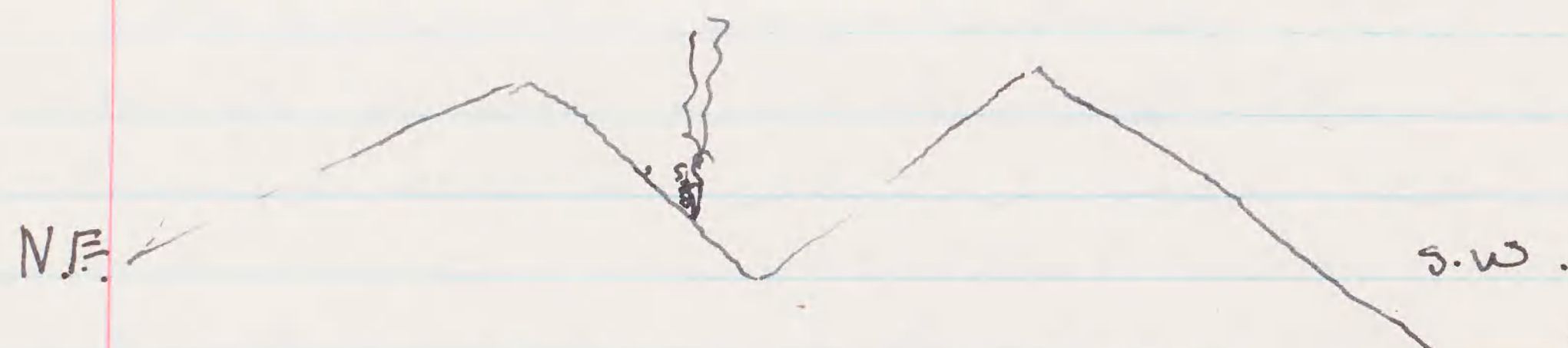
Eruptive column heavy with strong bursts, also heavy condensation cloud above the flow vent, continuing into night.

July 29, 1945.

Fairly clear in morning. Heavy eruptive column in morning and early afternoon.

Mid afternoon, variable with weak column varying to lazy steam column.

Keller, who flew over in the helicopter, reports a small new vent in the crater, about a meter across, from which came a steam jet. He could see no terraces.



Rain during later afternoon.

During night, clear sky, except for ash cloud and a few wisps of cloud.

Lightning

Much lightning in the lower part of the eruptive and a few faint flashes in the summit of the column. Vivid lightning far to the S.E.

Lightning vertical, inclined or horizontal. Several small sheet-like spots, that just reports from

his electroscope reading, has opposite sign from the other lightning.

Photos (1) (#) single large flash.
(2)	4 flashes 10 min
(3)	sheet flashes 15.
4	20 min.

Fairly good bursts, medium eruptive column. No apparent connection between bursts and lightning.

July 30, 1945.

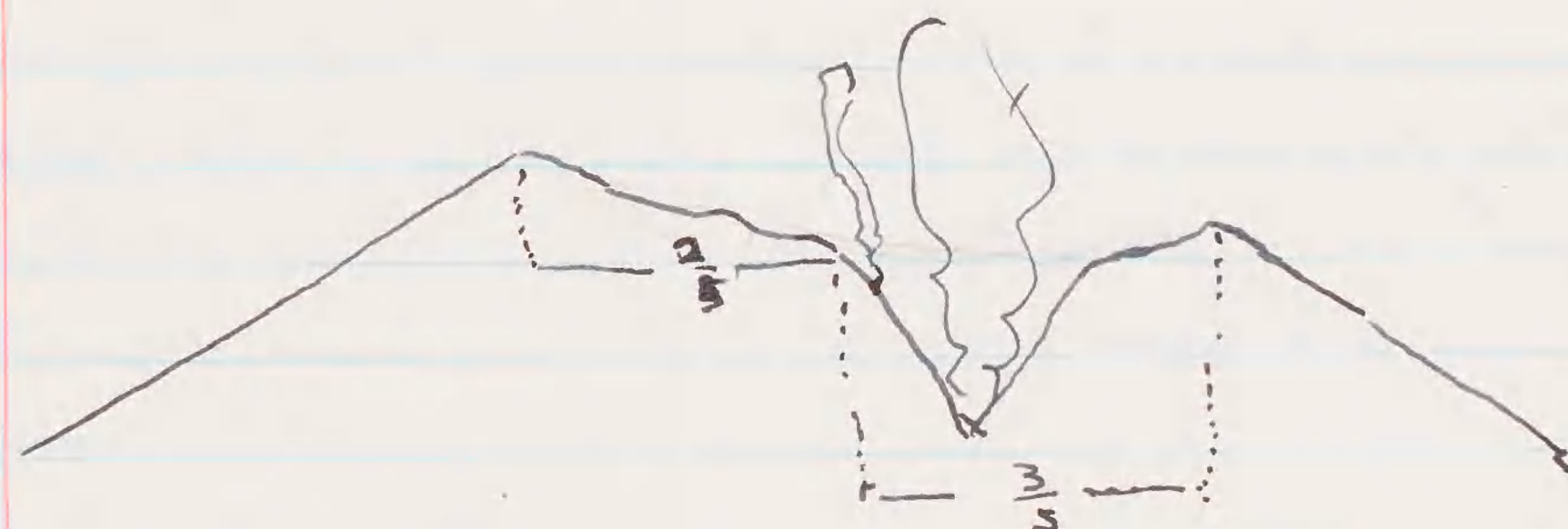
8:00 Fog over crater

9:00. Fairly thick column, rising languidly and drifting west over lip. Very little force, occasionally weak cauliflower and occasional small finger burst

July 31, 1945

8-12 Am. Heavy eruptive column all morning with black bursts from south crater. Helicopter flight

Active explosions from south throat. A small vent, about $\frac{1}{2}$ m. across yielding a small intermittent column of dirty steam. The crater shows a bench, broader to the N.E., narrow to the southwest.



12-5 pm. Cone obscured by rain and fog.

5 pm. Very heavy column, dark in color night: early evening fine bomb bursts with small vapor column.

Aug. 1, 1945.

Morning. Lazy column with weak cauliflower bursts drifting low over crater rim to west.

Clear & sunny in morning
Left San Juan 12: PM

During this period activity characterized by dense smoke column, fairly numerous bombs and general strong activity, steady lava flow from hornito vent. see photos for shape of crater. Usually one single vent, south vent, with minor and intermittent steam emission from a small throat without crater near north vent.

Aug. 6, 1945.

Left Uruapan 11:30 with Enrique.

Cantero and Genaro Gonzalez.

Stopped at the mouth of the Norte arroyo and saw little change from previous visit about a year ago, except the accumulation of washed in ash, extending for almost a kilometer along the lava front and almost a $\frac{1}{2}$ kilometer wide, with estimated depth of about six meters. Saw but two fumaroles on the whole lava field yielding bluish fumes, but a number of steam fumaroles, most of which seemed concentrated along the old arroyo course, yielding copious white steam. No steam vents along the immediate lava front facing Norte, indicating that this lava is cold. Little accumulation of water in ponds, indicating that the lava dam is very porous. Abundant log platform along the lava front.

From the crater arise a vapor cloud condensing about 250 m. above the crater, merging with low overhanging clouds, the condensing vapor having

frequently two tails or two bulges, like pants legs, one from the crater, one from the lava vent. The noise from the crater is a rumbling roar, indicating a strong steam vent. Rare and weak single ash bursts that rise lazily.

River of lava still very distinct but reported by Celadonio to be diminishing. The lava front between craters and the older lava is spreading and beginning to overtake the older lava.

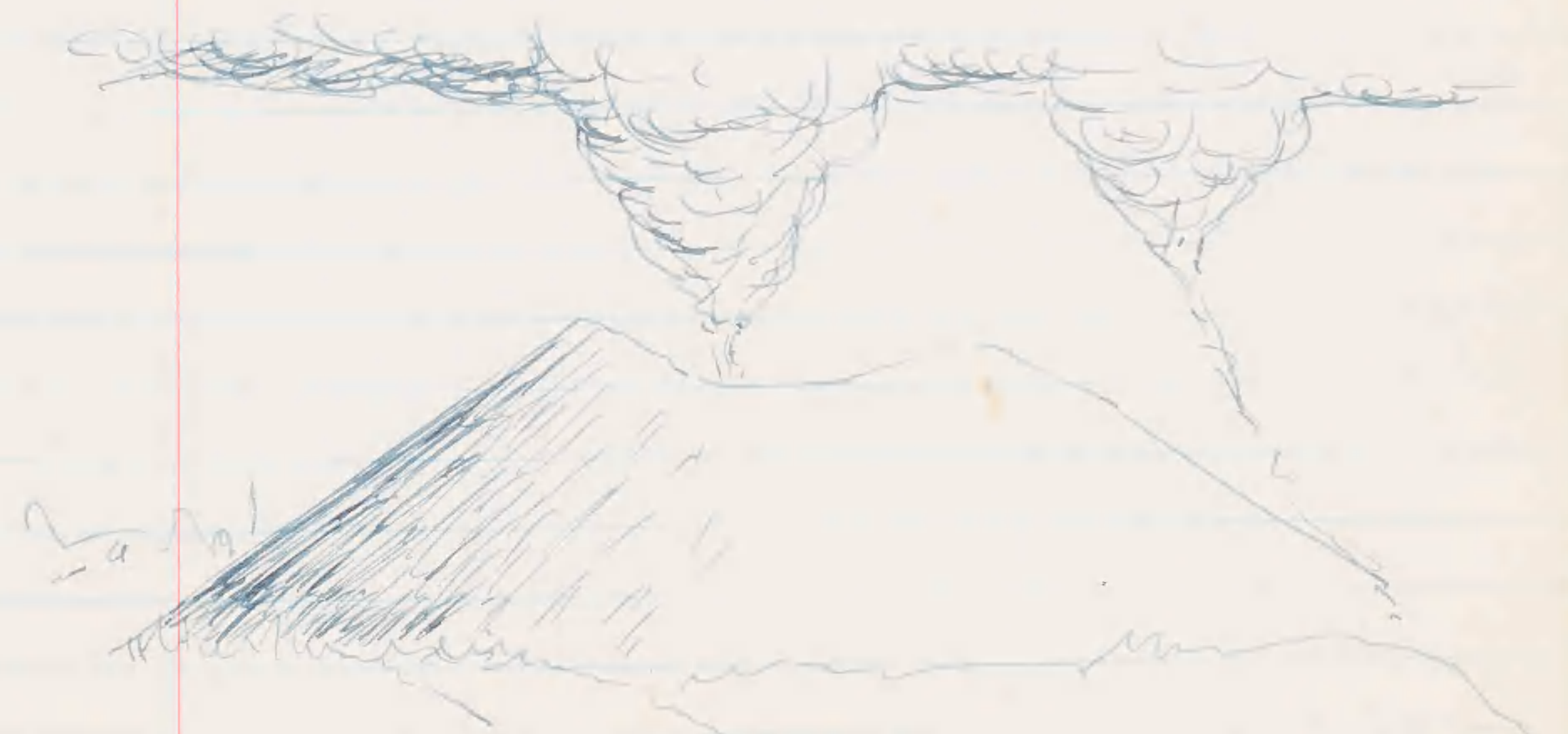
At times the cone seems clear but heavy rumbling roars suggests continued steam jet activity.

The condensation of the steam above the two throats forms tatters of steam, increasing in volume higher up to form tongues of steam, a dirty pale brown by transmitted light forming two cones projecting down from a low overhang of clouds.



Condensing vapors

4 P.M. Aug 6, 1945



6:30 P.M. Aug 6, 1945

Walked over the fields to observe erosion. Many shallow step-walled gullies, frequently exposing original soil, upon which are sprouting small seedlings, apparently a grass. The depth of the ash seems much reduced. Erosion in the deeper, original avogadro shows removal of all ash and considerable reworking in old material. Some transport of cobbles and small boulders out on ash by action of sheet floods.

Pine seedlings in ash in pine woods near Nono. Beans near Calui seem to be doing well. Nicotiana and Chicle thriving thru the ash.

Mauricio Duarte, Orio de Rosales, formerly San Juan states that on Sunday Feb. 21, 1943 the cone was about 25 meters high at 10 A.M. and the column rose higher than Tancitaro

Oct. 27, 1945.

Letter from John M. Barb.

"The night was exceptionally clear and the volcano was exceptionally active. It appeared to expend its power in a series of outbursts of progressively longer duration with pauses of perhaps ten minutes average length between explosions. The guides told us that it was more active than it had been for some time although these days previously, evidently the night of the 28th, ^a the new flow of lava had covered one section of the mountain and still flowed until it reached the bottom below.

The outburst was preceded by an unusually outstanding cannonade which lasted longer and threw stones higher than any we had seen. This eruption lasted for some time twenty minutes and at its height we saw lava begin to flow from an opening about half way up the North-west side. Steam, what appeared to be flame and a considerable amount of light, were emitted. During this

eruption we noticed that it required 9 seconds for one of the rocks to fall from its zenith to the crater; although there were others thrown higher we neglected to time them.

The explosions then began to diminish in intensity, the noise diminished, the amount of rocks thrown out decreased and the length of time between eruptions increased. These things occurred gradually, however. The flow from the new opening continued unabated, at least until after we returned to Uruapan at 3:00 PM.

John M. Barb.

Bridge's Movies

Nov. 14, 1949

Pure white steam column, with short sharp explosive puff, column rather weak, not rising high.

Can use his sequence, white eruptive column from base on cone no. 29. and shot of cone no. 19, with dead lumber.

Cloud's pictures. not much use.

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Fishers Originals

1. Ash fall at Angahuan.
2. Another
3. San Juan Church in lava, with Antonio Gutierrez.
4. Ruins of San Juan from Church.
5. Ruins of San Juan and the lava front from the S. end of the plaza, with Antonio Gutierrez.
6. San Juan lava looking toward the volcano.
7. Destruction of San Juan.
8. Burning of San Juan.
9. " " " "
10. Evacuation of San Juan.
11. Church of San Juan with volcano in back ground.
12. Looking down street of S.J. with lava, volcano in back ground.
13. View of volcano from S.J. - Zuvato road, with white eruptive column and cumulus head.
14. Life in San Juan: Kids riding pig.
15. " " " " : Last services in the church.
16. Life in San Juan: Boys playing marbles.
17. View of eruptive column from Polzcuaro - Ovis road.
18. Sunset view of column down a

street in Ovis.

19. Sunset view from Cocorau - May 1944
20. Another
21. Another looking into falling ash.
22. Crater from Cocorau.
23. Sunset from Cocorau, looking west.
24. Eruptive column at dusk.
25. Lazy eruptive column.
26. Low drifting column, July 1945.
27. Cone & white eruptive column. Helicopter in foreground.
28. Lava river, July 3, 1945. The lava dome from which the river issued with incandescent cracks and fumes.
29. Another, with weather.
30. The flow.
31. Bursts from the crater July 3, 1945.
32. Lava flowing down terraces at foot of Inabio, July 1945. Some flow as 22-30. but several weeks later.
33. Same. big bump coming down.
34. Another
35. Helicopter at cone.
36. Destruction of San Juan. Several sequences.
37. The Cone from the old Angahuan road, Magley in foreground.

- 38 Another
 39 Dancers on road, near Zacaquaro.
 40 Rainbow near Morelia.
 41 Another
 42 ?
 43 Lava advancing thru woods.
 This is the San Juan flow.
 44 Sampling a hornito for gases.
 45 Another
 46 A volcancito
 47 Volcancitos
 48 The hornitos fields (2)
 49 " " " "
 50 Lava flow, July 3, 1945 (2).
 51 The "Cave" in eruption with the
 "Soplete"
 52 Ordonez near the "Cave"
 53 Fuming hornitos
 54 " "
 55 " "
 56 The "Blister" (2)
 57 Ordonez at the "Blister".
 58 A volcancito in eruption
 59 A good Cauliflower column.
 60 Chuchi at a fumarole. ~~July 1945~~
 61 Fumaroles in Zapichu lava
 62 A fumarole in the Zapichu flow.
 63 Chuchi at very chloride fumarole
 on Zapichu flow

- 64 A lava front
 65 A nitro shot of the cone.
 67 Collecting minerals in an old
 hornito near Aguas Nov. 1944.
 68 A dissected hornito to show
 distribution of minerals.
 69 Fumes at the Aguas volcancitos.
 70 Another
 71 The Aguas volcancitos
 72 Chuchi at a fumarole.
 73 Perez Pena with gas collecting train.
 74 Fumaroles near 73.
 75 A hornito. A gas sample was
 taken from this one.
 76 Celadonio at a hornito
 77 Boys who ascended cone.
 78 Boys ascending cone.
 79. Big Remolino.

Crater Sequence: 85'		
Volcano with column		12'
Part of the crater		11
Brown column?		3.
White column	4 th.	5.
" "	4 th.	11
White column, 2 figures	4 th.	11
Fries, Dora, Celadonia on sum.		11
White column	4 th.	10
Incandescent vents		7 1/2

Fisher's Film

Reel # 1.

			feet	T.
Introductory	1.	Smoke column from highway	9	1/3
	2.	" " " " G + G. Sta., including pan up of column & view from Tarascan farm	45	1 1/2
	3.	Smoke column from Uruapan	9 1/2	1/3
March	4.	Fisher's early view day	63 1/2	2
	5.	" " " night	18	1/2
			36	1 1/3
			64	2.
Apr. 6		Graton's photo in April	50	2
	7.	OOF. San Juan	5.	
	8.	OOF clearing rocks in S.S.	7	
	9.	OOF Clyde & Hartweg at collapsed house	7 1/2	1.
	10.	OOF Front of S.S. Church, clearing church with wheelbarrow	5	
	11.	OOF F. & party on horse in S.S.	7 3/4	
Paricutin Village	12.	U.F.F. Houses & ash in Paricutin	7 3/4	1/4
	13.	F.P. Ash along Toluca Rd.	9 1/2	1/3
	14.	Cowhorn orchid with ash.	7 3/4	1/4
	15.	U.F.F. Houses covered with ash, with Luis, Paricutin Village	4	
	16.	Paricutin church, with Fisher's party on horse	11	1/3
			38	1
	17.	Cabin, with OOF, C.F. F.P.	6	
	18.	Cone and eruptive column from Cabin	7 1/2	1/2

19.	Side view of eruptive column Hard Cauliflowers in eruptive column	5 5 23½	$\frac{1}{3}$ 1
20	Panucuter Hill with crosses and Luis coming thru dust	8	$\frac{1}{4}$
21	C.F. Remolino at sunset	9	$\frac{1}{4}$
22	Base of Remolino	15½	
23	C.F. Remolino at sunset Wind effects	6½ 39	1
24	Top of cone & side of eruptive column, with bombs	12	
25	Bombs striking side of cone	4	
26	F.P. Cone with many bombs	5	
27	F.P. Bomb with broken limb	4	
28	F.P. Cooper at Bomb on Toluca road	5	
29	F.P. Bomb in ashbeds at Toluca rd. Bombs	5 35	1
30	F.P. Fogtag & Luis at Fumaroles	11	
31	Another	11	
32	Another	6	
33	F.P. Fogtag, Luis & Felipe walking into steam	18	
		56	1½
	End of Reel #1 332 feet 12-15 min.		

Reel # 2

1.	F.P. Pouch measuring T.	3½	
2	F.P. Thermocouple apparatus	1½	
3	A Dal ammoniac fumariale	12	
4	F.P. Using a high T. thermometer	10	
5	A Dal ammoniac fumariale, F.P. Scraping off salts	8	
6	Pouch removing condensing tube	6	
7	Fogtag at funnel Fumaroles	4 45	1½
F.P. 8	Twilight, June 9, explosive bursts	28	1
9	Next morning, cone slid out	8	
10	Terrace with falling rocks	23	
11	June 10th. Lava flow (1943)	52	
12	Lava flow, ash slopes, dead trees	6	
13	Luis below large block. Old ash covered lava below, fresh above	10	
14	The huge block falls	6	
15	Small patches of dripping lava. Pouch with optical pyrometer	8	
16	Block lava dripping	10	
17	Viscous lava	27	
18	OOF at Zapichu	8	
19	Luis & Chuchi at Zapichu	9	
20	Close up of Zapichu	10½	
21	Zapichu throat at night	11½	
22	Same. telephoto	18	
23	Zapichu bombs from the north	11	
	Zapichu		2½
24	Taqui	52	2½

	Hornitos		
	" with Feltz sublimates	12	
	Taguri	64+	3
	End of Reel #2.		
	360 feet		
	12-15 mins.		
	Reel #3.		
WFF 1	Hornitos burning	7.	
WFF 2	" "	3.	
WFF 3	" "	3.	
4	Frothing hornito	2	
5	Burning hornito	12.	
6	Hornito with ash, including burning volcancitos	15.	
7	Incandescent mound	5.	
8	Fishy Blister (?)	11	
	Hornitos + Volcancitos	58	2.
9	The charca, with lava	7	
10	The charca, closer view.	10	
11	The charca at night	5	
12	Another	14 $\frac{1}{2}$	8 $\frac{1}{2}$
13	Charca flowing. Day.	5	
14	" " Day.	5 $\frac{1}{2}$	
15	" " Day.	7 $\frac{1}{2}$	
16	" " "	15.	
17	" " night	19.	
18	" " "	8	
19	Poughs fountains	80	3.

	Volcanitos, Charca, Fountains	176	6 $\frac{1}{2}$
WFF 20	Lava advancing thru the woods	5	$\frac{1}{2}$
WFF 21	Another	5.	
	S.S. Lava advancing to S.J.	10	$\frac{1}{2}$
22	Cone from San Juan July 1944 Start of destruction.	5 $\frac{1}{2}$	
23	View from Chapel Hill; lava advancing into town; house burning	3	
24	Lava coming down arroyo, S.J.	38.	
25.	Ordones and others at lava front.	8	
26	Jenaro lighting cigarette	5	
27	Tariascans at lava	5	
28	Boys with crosses in S.J.	2.	
29	Cladonio at burning house.	5	
30	Women carrying plank, etc.	36	
31	Sunset.	11	
	Destruction of San Juan.	118	5 $\frac{1}{2}$

End of Reel #3

360 feet

15-17 mins.

Remains of S. J.
 Traversing lava flow
 Oct, Audrey et al.

Side of slope with boulders

coming down.

Boulders falling down slope

Audrey at lava front note
 rubble front.

Pale gray smoke column

S. J. lava at S. J.

More lavae above

especially Aguan lava flow

Go to leaving from

Church tower

after

S. J. ruins.

13

Cerrona.

Urmapan

Race track.

Old lava terraces

Conejos.

The Cerrona

Are view note Zapichu

Lava river.

Chilgortin Lava flow.

Williams Pass & what
old crater in background

001- Lava river

Note at end of lava.

Note like

Zapichu.

Viscous Lava, T-1100C.

Chunks breaking off. Note

Sharp darkening

00F + Zapichu.

Two + Chulchil of Zapichu

Zapichu at dusk.

Zapichu at night.

Tagu the salmon pools

Note the purges.

Tagu note steam above

and the blue fumes.

Note gludity of lava, about

1150'

The Hornito + volcanoes

Choking fumes

Hornito area, yellow sulphur

#2

Pouch taking T. near.

Fumarole with NH₄Cl.Small fumarole with therm.
NH₄Cl crust.

Collecting sub in lake

Cone at night on

June 9 small column

Bombs at night

Break neck day

Terraces moving. note

Fig

moving terraces.

Saw glow. Big rolling

boulders. Dust - not clear

streaming gravel.

Extent of lava, dead trees
and ash covered area

Ash covered glow will

later advancing glow

Pouch measurement T.

with optical Pyrometer



